

CLAIMS

1. A color conversion method for converting an input monochrome signal into a color signal on a predetermined color space, comprising:
 - 5 a setting step of setting a tincture adjustment value used to adjust the input monochrome signal to a desired tincture of a user;
 - an acquisition step of acquiring color reproduction characteristics which depend on an image
10 output apparatus and a recording medium;
 - a first conversion step of converting the input monochrome signal into a first color signal using the color reproduction characteristics acquired in the acquisition step;
 - 15 a second conversion step of converting the first color signal converted in the first conversion step into a second color signal using the tincture adjustment value set in the setting step and the color reproduction characteristics acquired in the
20 acquisition step;
 - a third conversion step of converting the second color signal converted in the second conversion step into a third color signal; and
 - an output step of forming and outputting a color
25 signal on the color space on the basis of the third color signal converted in the third conversion step and

the first color signal converted in the first conversion step.

2. The method according to claim 1, wherein the second conversion step includes a step of converting
5 the first color signal into the second color signal using the tincture adjustment value set in the setting step and the color reproduction characteristics acquired in the acquisition step.

3. The method according to claim 2, wherein the
10 color signal on the color space is expressed by a lightness value, and a chromaticity point which pertains to hue and saturation attributes.

4. The method according to claim 3, wherein the setting step includes a step of setting, as the
15 tincture adjustment value, at least either a chromaticity point on the color space corresponding to a predetermined monochrome signal or a change rate of a predetermined chromaticity point on the color space.

5. The method according to claim 4, wherein the
20 acquisition step includes a step of acquiring, as the color reproduction characteristics, color signals on the color space, which correspond to monochrome signals indicating white and black.

6. The method according to claim 5, wherein in the
25 setting step, the predetermined monochrome signal is a monochrome signal corresponding to middle lightness, and the change rate of the predetermined chromaticity

point is a change rate of chromaticity points associated with monochrome signals of highlight and shadow parts.

7. The method according to claim 5, wherein in the setting step, the change rate of the predetermined chromaticity point is a change rate of distance on a line segment L in association with a monochrome signal, when the line segment L represents a line segment which connects the chromaticity point, which corresponds to the monochrome signal indicating white acquired in the acquisition step, the chromaticity point set in the setting step, and the chromaticity point, which corresponds to the monochrome signal indicating black acquired in the acquisition step.

8. The method according to claim 7, wherein the first conversion step includes a step of converting the input monochrome signal into a color signal indicating a lightness value on the color space,

the second conversion step includes a step of converting the first color signal converted in the first conversion step into a color signal indicating a distance on the line segment L,

the third conversion step includes a step of converting the second color signal converted in the second conversion step into a color signal indicating a chromaticity point on the color space, and

the output step includes a step of forming and outputting the color signal on the color space, on the basis of the first signal which is converted in the first conversion step and indicates the lightness value
5 on the color space, and the third color signal which is converted in the third conversion step and indicates the chromaticity point on the color space.

9. The method according to claim 8, wherein the color space is a CIE/L*a*b* color space on which a
10 lightness value is represented by L* and a chromaticity point is represented by a* and b*.

10. The method according to claim 8, wherein the setting step includes a step of setting the chromaticity point and the chromaticity point change
15 rate within predetermined ranges.

11. A profile generation method for generating a profile which stores a relationship between monochrome signals and color signals on a predetermined color space, comprising:

20 a setting step of setting a tincture adjustment value used to adjust monochrome signals to a desired tincture of a user;

an acquisition step of acquiring color reproduction characteristics which depend on an image
25 output apparatus and a recording medium;

a generation step of generating discrete monochrome signals;

a first conversion step of converting the monochrome signals generated in the generation step into first color signals using the color reproduction characteristics acquired in the acquisition step;

5 a second conversion step of converting the first color signals converted in the first conversion step into second color signals using the tinture adjustment value set in the setting step and the color reproduction characteristics acquired in the

10 acquisition step;

a third conversion step of converting the second color signals converted in the second conversion step into third color signals; and

a profile generation step of generating a profile
15 on the basis of the third color signals converted in the third conversion step and the first color signals converted in the first conversion step.

12. The method according to claim 11, wherein the second conversion step includes a step of converting
20 the first color signals converted in the first conversion step into the second color signals using the tinture adjustment value set in the setting step and the color reproduction characteristics acquired in the acquisition step.

25 13. The method according to claim 12, wherein each color signal on the color space is expressed by a

lightness value, and a chromaticity point which pertains to hue and saturation attributes.

14. The method according to claim 13, wherein the setting step includes a step of setting, as the
5 tincture adjustment value, at least either a chromaticity point on the color space corresponding to a predetermined monochrome signal or a change rate of a predetermined chromaticity point on the color space.

15. The method according to claim 14, wherein the
10 acquisition step includes a step of acquiring, as the color reproduction characteristics, color signals on the color space, which correspond to monochrome signals indicating white and black.

16. The method according to claim 15, wherein in the
15 setting step, the predetermined monochrome signal is a monochrome signal corresponding to middle lightness, and the change rate of the predetermined chromaticity point is a change rate of chromaticity points associated with monochrome signals of highlight and
20 shadow parts.

17. The method according to claim 15, wherein in the setting step, the change rate of the predetermined chromaticity point is a change rate of distance on a line segment L in association with a monochrome signal,
25 when the line segment L represents a line segment which connect the chromaticity point, which corresponds to the monochrome signal indicating white acquired in the

acquisition step, the chromaticity point set in the setting step, and the chromaticity point, which corresponds to the monochrome signal indicating black acquired in the acquisition step.

5 18. The method according to claim 17, wherein the first conversion step includes a step of converting the monochrome signals generated in the generation step into color signals indicating lightness values on the color space,

10 the second conversion step includes a step of converting the first color signals converted in the first conversion step into color signals indicating distances on the line segment L,

the third conversion step includes a step of
15 converting the second color signals converted in the second conversion step into color signals indicating chromaticity points on the color space, and

the profile generation step includes a step of generating the profile using the first signals which
20 are converted in the first conversion step and indicate the lightness values on the color space, and the third color signals which are converted in the third conversion step and indicate the chromaticity points on the color space.

25 19. The method according to claim 18, wherein the color space is a CIE/L*a*b* color space on which a

lightness value is represented by L^* and a chromaticity point is represented by a^* and b^* .

20. The method according to claim 18, wherein the setting step includes a step of setting the
5 chromaticity point and the chromaticity point change rate within predetermined ranges.

21. An image conversion method for converting input monochrome image data into color image data for an image output apparatus designated by a user,
10 comprising:

a setting step of setting a tincture adjustment value used to adjust the input monochrome image data to a desired tincture of a user;

an acquisition step of acquiring color
15 reproduction characteristics which depend on the image output apparatus and a recording medium;

a first conversion step of converting monochrome signals which form the input monochrome image data into first color signals using the color reproduction
20 characteristics acquired in the acquisition step;

a second conversion step of converting the first color signals converted in the first conversion step into second color signals using the tincture adjustment value set in the setting step and the color
25 reproduction characteristics acquired in the acquisition step;

a third conversion step of converting the second color signals converted in the second conversion step into third color signals; and

a conversion step of converting the third color
5 signals converted in the third conversion step and the first color signals converted in the first conversion step into color image data for the image output apparatus, and outputting the color image data.

22. The method according to claim 21, wherein the
10 second conversion step includes a step of converting the first color signals converted in the first conversion step into the second color signals using the tincture adjustment value set in the setting step and the color reproduction characteristics acquired in the
15 acquisition step.

23. The method according to claim 22, wherein each color signal on the color space is expressed by a lightness value, and a chromaticity point which pertains to hue and saturation attributes.

20 24. The method according to claim 23, wherein the setting step includes a step of setting, as the tincture adjustment value, at least either a chromaticity point on the color space corresponding to a predetermined monochrome signal or a change rate of a
25 predetermined chromaticity point on the color space.

25. The method according to claim 24, wherein the acquisition step includes a step of acquiring, as the

color reproduction characteristics, color signals on the color space, which correspond to monochrome signals indicating white and black.

26. The method according to claim 25, wherein in the
5 setting step, the predetermined monochrome signal is a monochrome signal corresponding to middle lightness, and the change rate of the predetermined chromaticity point is a change rate of chromaticity points associated with monochrome signals of highlight and
10 shadow parts.

27. The method according to claim 25, wherein in the setting step, the change rate of the predetermined chromaticity point is a change rate of distance on a line segment L in association with a monochrome signal,
15 when the line segment L represents a line segment which connects the chromaticity point, which corresponds to the monochrome signal indicating white acquired in the acquisition step, the chromaticity point set in the setting step, and the chromaticity point, which
20 corresponds to the monochrome signal indicating black acquired in the acquisition step.

28. The method according to claim 27, wherein the first conversion step includes a step of converting the monochrome signals which form the input monochrome
25 image data into color signals indicating lightness values on the color space,

the second conversion step includes a step of converting the first color signals converted in the first conversion step into color signals indicating distances on the line segment L,

- 5 the third conversion step includes a step of converting the second color signals converted in the second conversion step into color signals indicating chromaticity points on the color space, and

 the conversion step includes a step of converting
10 the first signals, which are converted in the first conversion step and indicate the lightness values on the color space, and the third color signals, which are converted in the third conversion step and indicate the chromaticity points on the color space, into color
15 image data for the image output apparatus, and outputting the color image data.

29. The method according to claim 28, wherein the color space is a CIE/L*a*b* color space on which a lightness value is represented by L* and a chromaticity
20 point is represented by a* and b*.

30. The method according to claim 28, wherein the setting step includes a step of setting the chromaticity point and the chromaticity point change rate within predetermined ranges.

25 31. An image processing apparatus for converting an input monochrome signal into a color signal on a

predetermined color space, and outputting the color signal, comprising:

setting means for setting a tincture adjustment value used to adjust the input monochrome signal to a
5 desired tincture of a user;

acquisition means for acquiring color reproduction characteristics which depend on an image output apparatus and a recording medium;

first conversion means for converting the input
10 monochrome signal into a first color signal using the color reproduction characteristics acquired by said acquisition means;

second conversion means for converting the first color signal converted by said first conversion means
15 into a second color signal using the tincture adjustment value set by said setting means and the color reproduction characteristics acquired by said acquisition means;

third conversion means for converting the second
20 color signal converted by said second conversion means into a third color signal; and

output means for forming and outputting a color signal on the color space on the basis of the third color signal converted by said third conversion means
25 and the first color signal converted by said first conversion means.

32. An image processing apparatus for generating a profile which stores a relationship between monochrome signals and color signals on a predetermined color space, comprising:

5 setting means for setting a tincture adjustment value used to adjust monochrome signals to a desired tincture of a user;

 acquisition means for acquiring color reproduction characteristics which depend on an image
10 output apparatus and a recording medium;

 generation means for generating discrete monochrome signals;

 first conversion means for converting the monochrome signals generated by said generation means
15 into first color signals using the color reproduction characteristics acquired by said acquisition means;

 second conversion means for converting the first color signals converted by said first conversion means into second color signals using the tincture adjustment
20 value set by said setting means and the color reproduction characteristics acquired by said acquisition means;

 third conversion means for converting the second color signals converted by said second conversion means
25 into third color signals; and

 profile generation means for generating a profile on the basis of the third color signals converted by

said third conversion means and the first color signals converted by said first conversion means.

33. An image processing apparatus for converting input monochrome image data into color image data for
5 an image output apparatus designated by a user, and outputting the color image data, comprising:

setting means for setting a tincture adjustment value used to adjust the input monochrome image data to a desired tincture of a user;

10 acquisition means for acquiring color reproduction characteristics which depend on the image output apparatus and a recording medium;

first conversion means for converting monochrome signals which form the input monochrome image data into
15 first color signals using the color reproduction characteristics acquired by said acquisition means;

second conversion means for converting the first color signals converted by said first conversion means into second color signals using the tincture adjustment
20 value set by said setting means and the color reproduction characteristics acquired by said acquisition means;

third conversion means for converting the second color signals converted by said second conversion means
25 into third color signals; and

conversion means for converting the third color signals converted by said third conversion means and

the first color signals converted by said first conversion means into color image data for the image output apparatus, and outputting the color image data.

34. A program for making a computer execute a color
5 conversion method of claim 1.

35. A program for making a computer execute a color conversion method of claim 11.

36. A program for making a computer execute a color conversion method of claim 21.

10 37. A color conversion method for converting an input monochrome signal into a color signal on a predetermined color space, comprising:

a setting step of setting a tincture adjustment value used to adjust the input monochrome signal to a
15 desired tincture of a user;

an acquisition step of acquiring color reproduction characteristics which depend on an image output apparatus and a recording medium;

a first conversion step of converting the input
20 monochrome signal into a first color signal using the color reproduction characteristics acquired in the acquisition step;

a second conversion step of converting the monochrome signal into a second color signal using the
25 tincture adjustment value set in the setting step and the color reproduction characteristics acquired in the acquisition step;

a third conversion step of converting the second color signal converted in the second conversion step into a third color signal; and

an output step of forming and outputting a color
5 signal on the color space on the basis of the third color signal converted in the third conversion step and the first color signal converted in the first conversion step.

38. A profile generation method for generating a
10 profile which stores a relationship between monochrome signals and color signals on a predetermined color space, comprising:

a setting step of setting a tincture adjustment value used to adjust monochrome signals to a desired
15 tincture of a user;

an acquisition step of acquiring color reproduction characteristics which depend on an image output apparatus and a recording medium;

a generation step of generating discrete
20 monochrome signals;

a first conversion step of converting the monochrome signals generated in the generation step into first color signals using the color reproduction characteristics acquired in the acquisition step;

25 a second conversion step of converting the monochrome signals generated in the generation step into second color signals using the tincture adjustment

value set in the setting step and the color reproduction characteristics acquired in the acquisition step;

5 a third conversion step of converting the second color signals converted in the second conversion step into third color signals; and

a profile generation step of generating a profile on the basis of the third color signals converted in the third conversion step and the first color signals converted in the first conversion step.

39. An image conversion method for converting input monochrome image data into color image data for an image output apparatus designated by a user, comprising:

15 a setting step of setting a tincture adjustment value used to adjust the input monochrome image data to a desired tincture of a user;

an acquisition step of acquiring color reproduction characteristics which depend on the image output apparatus and a recording medium;

20 a first conversion step of converting monochrome signals which form the input monochrome image data into first color signals using the color reproduction characteristics acquired in the acquisition step;

25 a second conversion step of converting the monochrome signals which form the input monochrome image data into second color signals using the tincture

adjustment value set in the setting step and the color reproduction characteristics acquired in the acquisition step;

5 a third conversion step of converting the second color signals converted in the second conversion step into third color signals; and

a conversion step of converting the third color signals converted in the third conversion step and the first color signals converted in the first conversion
10 step into color image data for the image output apparatus, and outputting the color image data.

40. An profile generating method for generating a profile to convert input image data into uniform tone image data for an image output apparatus, comprising:

15 a setting step of setting a tincture adjustment value used to adjust the input image data to a desired tincture uniform tone image of a user;

an acquisition step of acquiring color reproduction characteristics which depend on the image
20 output apparatus and a recording medium;

a profile generating step for generating a profile to form the uniform tone image by using the tincture adjustment value and the acquired color reproduction characteristics.